

# THE Encyclopedia

# AMERICANA

COMPLETE IN  
THIRTY VOLUMES

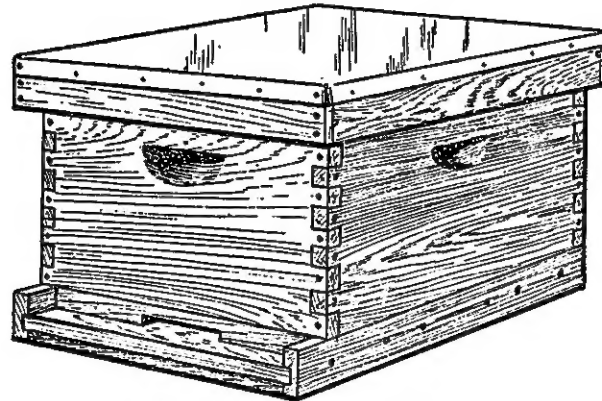
1829



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**Diseases of Brood.**—There are two diseases that attack the brood of honeybees; one is known as American, and the other as European foul brood. The American foul brood is the more serious, so serious that no cure can be safely applied. The bee-keeper who finds it in his hives should burn the combs, bees and all, and scorch out the inside of the hive with a blow torch before it is used again. The second disease known as European foul brood, can be cured by building up the strength of the colony, introducing a queen of vigorous, Italian strain. The building-up consists of giving frames of emerging brood so that the strength of the colony will be rapidly increased. For further particulars, send to the Bureau of Entomology, Bee Culture Laboratory, Washington, D.C. Treatment and cure will be described for both diseases, except that in the case of American foul brood, complete destruction of bees is recommended.



Modern hive of "Langstroth" dimensions.

**Enemies of Bees.**—A number of insects, birds, and mammals must be classed as enemies of bees, but of these the larger wax moth, the lesser wax moth, and ants are the only ones of importance. Moth larvae often destroy combs. To prevent this the combs are fumigated with paradichlorobenzene or bisulphide of carbon in tiers of hives or in tight rooms. In warm climates ants are a serious pest. The usual method of keeping them out is to put the hive on a stand, the legs of which rest in vessels containing oil or creosote.

**BEE LARKSPUR.** A well-known flowering plant, *Delphinium elatum*, having a flower resembling a bee.

**BEE LOUSE** (*Braulta coeca*), is a parasite on the honeybee, occurring on the thorax especially of the queen bee—rarely on the drones. Frank Benton, American apiculturist, states that he at one time removed as many as 75 from a queen, though the numbers do not generally exceed a dozen. The bee louse is about one-twentieth of an inch in length, entirely without wings, and somewhat spiderlike in appearance. On the day the maggot or larva hatches from the egg it sheds its skin and turns to an oval puparium of a dark-brown color. It has frequently been imported to the United States on queens with attendant bees but has gained no foothold.

**BEE MARTIN**, the kingbird, a flycatcher which occasionally eats bees. See KINGBIRD.

**BEE MOTH**, a moth belonging to the family Galleridae; specifically, *Galleria mellonella*, the larva of which feeds on wax in hives. The worm is yellowish-white with brownish dots. It constructs silken galleries running through the comb of the beehive on which it feeds. When about to transform it spins a thick white cocoon. Two broods of the moth appear, one in the spring, the other in August, and the caterpillars mature in about three weeks. It may become a most troublesome pest in the apiary.

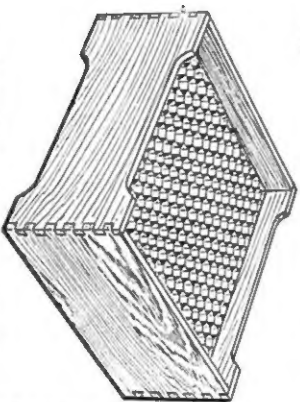
**BEE ORCHIS**, the name of a species of orchis, the *Arachnites apifera*. It is so called because a part of the flower resembles a bee. It is large, with the sepals purplish or greenish-white, and the lip brown variegated with yellow.

**BEE TREE**, a forest tree inhabited by honey-making bees, which have taken possession of some natural hollow and filled it with combs. Such a tree may be found by accident, or by deliberate hunting. Those in search take to the edge of the woods a box of diluted honey, and when they see bees near them, open the bait to which one by one the bees will be attracted. The direction of their flight is then carefully observed; the bait is moved to another point.



wax, which is secreted by the bees and used by them for building their combs, is an important commercial product and commands a good price in the United States. Three to five million pounds are produced there annually. This wax is used for waterproofing, for sacramental candles, and in cosmetics. Frequently there are combs to be melted up, and it pays to take care even of scraps of comb and the capings taken out in extracting. A common method of taking out the wax is to melt the combs in a glass-covered pan heated by the sun. Various wax presses are on the market, but if much wax is produced, it is advisable that the bee-keeper make a careful study of the methods of wax extraction as usually there is much wax wasted.

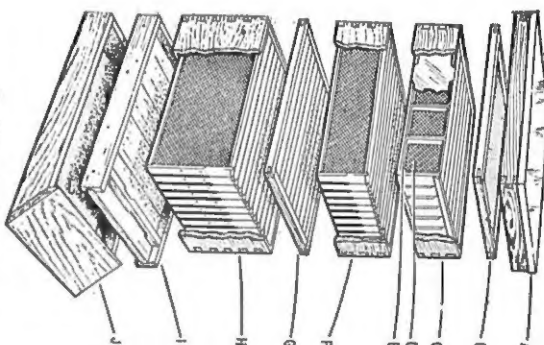
**Comb Honey Production.**—Comb honey is usually put up in little square boxes, of which several million are made and used in the United States annually. The honey in these boxes is in the liquid form, drawn from the combs by means of centrifugal force in a honey extractor, hence the name. Honey in the comb cannot be adulterated or manufactured, newspaper reports to the contrary. One bee-keeper of considerable standing and prominence has had a standing offer of \$1,000 for a single sample of artificial comb honey so perfect as to deceive the ordinary consumer. Notwithstanding that this offer has been broadly published over the United States for over 30 years, no one has ever claimed the reward. It may be well to explain that a partial basis for these newspaper reports lies in the fact that beekeepers use a commercial product known as "comb foundation," which is sheeted wax embossed on both sides with indentations having the exact shape and form of the bottom of the cells of honeycomb—hence the name. It is put into the hive where the bees draw it out into comb. This is as far as the skill of man can go; hence there is no such thing as artificial comb honey.



Section containing full sheet of comb foundation.

Producing comb honey requires considerable skill. Hives and supers are so arranged that the little boxes containing strips of comb foundation shall be accessible to the bees where they can build the foundation into comb, fill the cells with honey and seal them over. When the bees are busy at work in the fields and the combs are beginning to whiten and to be bulged with honey in what is called the brood nest, the honey boxes are put in the upper part of the hive. These are allowed to remain on during the height of the

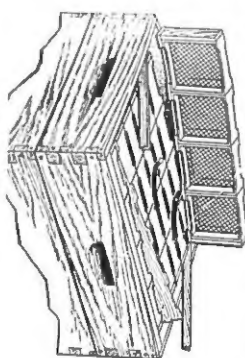
honey flow until they are filled and capped over, when they are removed and others put in their place.



Bee hive for comb honey

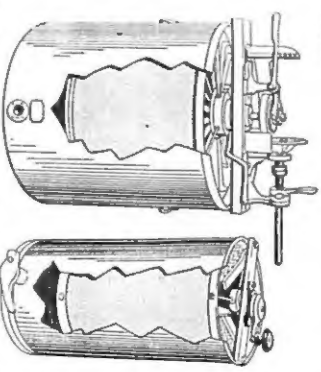
**Parts list:**  
A—metal chaf cover, helps insulate bees from heat and cold and aid in handling bees.  
B—section super, for comb honey in handling bees.  
C—thin honey box.  
D—thin honey box.  
E—comb foundation.  
F—section box.  
G—excelsior.  
H—supers, with frames for storage of honey.  
I—honey box.  
J—hive stand, extra equipped as conditions warrant.  
K—hive from the ground.

**Extracted Honey Production.**—The business of producing extracted (or liquid) honey requires almost the same intelligent care and attention. Instead of section boxes, however, an extra set of combs is put in the upper story, the same being placed above the lower or brood part of the hive. When these are filled with honey and capped over, they are removed from the hive by first shaking the bees off, or by what is known as a bee-escape board, taken to the extracting house and extracted. The thin film of wax covering the comb is shaved off with a knife specially designed for the purpose. After the combs are uncapped, they are put in the honey extractor and revolved at a high rate of speed. The honey flows out of the comb by centrifugal force against the sides of the extractor, when the combs are reversed, exposing the other surfaces which are emptied in a like manner. The surfaces which are turned to the hive to be filled by the bees, when the process may be repeated as long as the season lasts.



Beehive section super.

As reached a high state of prosperity and the combs are being filled with honey, a swarm may come forth between the hours of 9 a.m. and 3 p.m. Most of the bees, including the queen, are pretty sure to come out with a rush, thousands of them being in the air. The bees hover about 15 or 20 minutes, when they will in all probability cluster on some bush or tree. They will all here for two or three hours, or perhaps overnight, at the end of which time they will take wing again and go direct into some hollow tree or cave where they will take up new quarters and start housekeeping anew. The young bees, together with those unimpaired, with one or more young queens, are left to take care of the old hive.

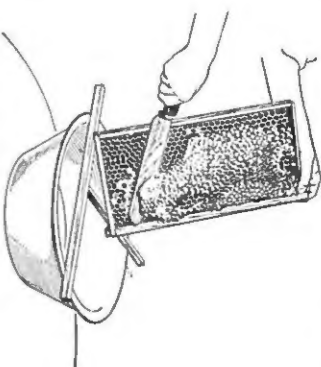


Honey extractor: left, power-operated; right, hand-operated.

In ordinary practice it is a custom for the bee-keeper to remove the swarm by taking the bees as soon as they cluster and putting them into another hive. Or, he may, if he chooses, let the old queen's bees, preventing her flight with the swarm; and when the bees come forth they will crawl out of the entrance to be captured by her owner and as soon as her subjects return, which they will do to find their royal mother, they are allowed to go into a new hive on the old stand, while the old hive is carried to another location in the bee yard.

**Prevention of Swarming.**—Since crowded and overcrowded hives are conducive to swarming, this tendency is overcome by giving plenty of ventilation and additional room in the hive.

Shade is also a good preventive. Frequent examinations of the hive during the swarming season for the purpose of cutting out queen cells is a help, and removing with young queens early in the season generally prevents swarming.



Bee-keeper removing capings from a comb.

**Robbing.**—There are certain times during the season when no nectar is secreted by the flowers. It is during such periods as this that the bees will rob each other if they can. When sweets can be obtained in considerable quantity from a weak colony unable to defend itself, the bees are apt to become furious and their craze is not unlike that of gold miners when gold is discovered in large quantities. There is a rush and when the sweets are suddenly cut off, the bees are inclined to be cross and to sting. The wise and careful bee-keeper will see to it that the entrance of his weak colonies are properly protected so that the soldiers or guards can protect themselves from intrusion from other bees.

**Feeding.**—When bees are short of honey, sugar syrup may be substituted. This is fed to the bees in an inverted can with a few small holes punched in the lid. This is placed on top of the beehive, feeding, at best, is a necessary evil. It is always better to give bees combs of honey or better yet, a whole hive body of combs containing honey. Sugar syrup—two parts sugar, one part water—is not a natural food and should be used only when no sweet is available from the field.

**Transferring.**—In increasing the apiary it is sometimes best to buy colonies in box hives on account of their smaller cost, and to transfer them to hives with movable frames. This should be done as soon as possible, for box-hive colonies are of small value as producers. The best time to transfer is in the spring, when the amount of honey and the population of the colony are at a minimum. Transferring need not be delayed until spring merely because that season is best for the work. It may be done at any time during the active season, but, whenever possible, during a honey flow, to prevent robbing.

**Wintering.**—During the winter it is often desirable to protect the hives with waterproof paper, with packing material between hive and paper in cold climates. The entrances should be contracted down to shut out as much cold as possible. In extremely cold climates the hives may be carried into a suitable cellar.



apparently causes one individual to emerge from a cell and another to emerge from a cell in the egg stage the preadult stage, queen, and male is respectively 16, 21, and 24 days. The adult life of the queen is about 2 years; the period of active nectar flow is about six weeks; during the much more favorable conditions it is six months or more.



of a comb of *Apis mellifica*, with some of them capped, others open) and the royal cell. Natural size.

tolerated in the hive until the queen is sharply dwindled. Then what is often referred to as the drones. It usually represents a frustration of their subsequence. As the drones are on the workers for food, expatriation home is the equivalent death.

of its development a *mellifica* needs 70,000 bees. New hives are swarming. The old queen departs, and her successor in the hive (provided there is no afterswarm) leads the royal daughters to a new exodus of the swarm. To the princess often slays her royal mother and still imprisoned in their nest and stinging them. Taking experiments performed have established that red and orange are distinguishable to honeybees, that they fly with orange and green, and blue-green they recognize as blue and yellow. Finally they see that is invisible to man.

has established the fact that a

has confirmed that honeybees are able to orient themselves by the polarization of sky light.

Interesting as are the discoveries made thus far regarding bees, it is safe to predict that much of a rewarding character still awaits the enterprising student of their ways.

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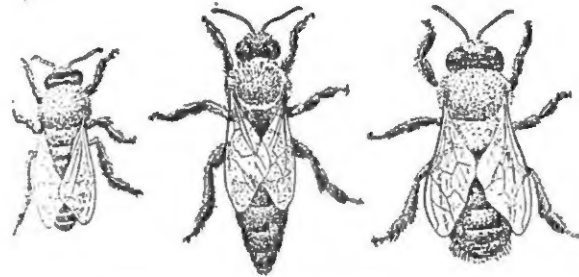
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**BEE BIRDS**, birds reputed to devour bees, especially the honeybee. Not many birds have this habit, the bees being protected against most birds by their stings. A few flycatching birds, however, have learned how to avoid being stung, and catch not only bees but wasps, take them to a perch and beat them, so as to kill them, and probably get rid of the sting before swallowing them. Notable among these are the European and African bee eaters (q.v.). The American kingbirds (q.v.) also catch bees, but not as frequently as is popularly supposed, and are known in the Southern states as bee martins.

**BEE EATER**, a small, richly plumaged and graceful bird of southern Europe and northern Africa, whose food consists almost entirely of bees.

orange and mountain sage; in the North Central and Eastern states, white, alsike, the new Ladino, sweet clover; in the South and West, orange, clover, palmetto, cats-claw, mesquite, and guava.



Left to right: worker; queen bee; drone.

Most authorities agree that the honeybees' value lies in their ability to cross-pollinate fruit and legume blossoms, and thus largely increase the production of fruit and seed. Bees are responsible for 80-85 per cent of all crop pollination performed by insects. With the increased use of insecticides and more intensive cultivation of the land, many wild insects have been destroyed in recent years, leaving the important work of pollination more and more to the honeybees.

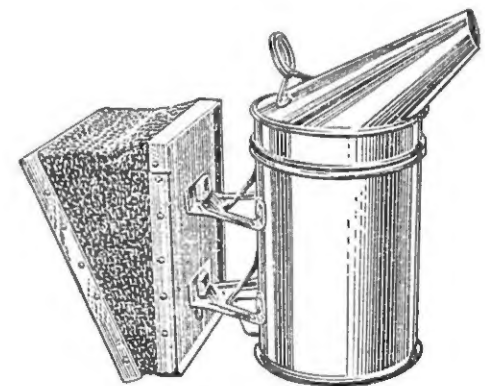
To assist in pollination and to increase the number of colonies, bees are shipped by the pound from the South. In 1948 more than a million pounds of bees were shipped in two- and three-pound cages without combs.

There are several species of bees—*Apis dorsata*, or the giant bee of India and the Philippines; *A. indica*, of India; *A. florica*, and *A. mellifica*. From a commercial standpoint, the last mentioned is the most important. It comprises the black bee of this country; the Italian bee from the southern part of Italy; the Syrian bee of Palestine; the Cyprian, from the island of Cyprus; the Carniolan, from Austria, and the Caucasian from the Caucasus Mountains. But the most important of all these varieties is the Italian bee. They are the most industrious and the gentlest. They, together with the black bees and their crosses, incorrectly termed "hybrids," are used most extensively in the United States—indeed, throughout much of the civilized world.



mother of the whole colony. The drones are incapable of gathering honey, and serve only one purpose—that of fertilizing or fecundating the young queens, which act takes place in the air. The workers gather all the honey and pollen, fill all the combs, and rear the young or baby bees. As soon as the mating season is over, the drones are allowed to starve.

**How to Handle Bees.**—There is a general impression that ordinary honeybees are vicious, ready to attack any one who comes near their hives. This is a great mistake. Under certain conditions, when their habits are known, they will permit one to tear their hives apart, rob them of their hard earnings—honey and the wax—without even offering to sting. But an inexperienced or awkward person may irritate them. To bring them into a state of subjection it is only necessary to blow smoke into the entrance and over the combs, at which time, if the motions about the hive are careful and deliberate, they will offer no attack. Smoke, when intelligently used, disarms opposition and puts the bees in a quiet state.

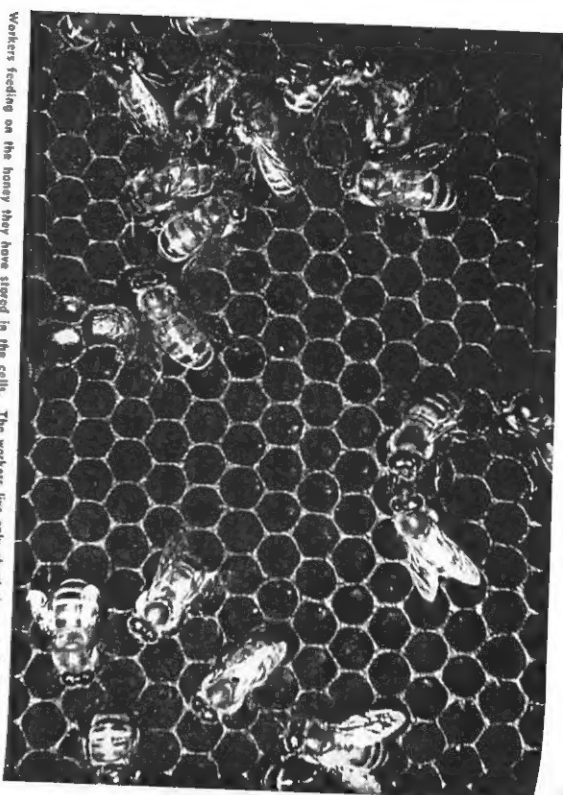


Bee-smoker.

The bee-smoker is simply a small bellows attached to a cylindrical stove having a nozzle from which the smoke is blown. Besides the bee-smoker, the bee-keeper generally uses a bee-veil made of wire cloth. Gloves are sometimes used by timid persons or beginners, but as a general thing all work with the bees is performed with bare hands. Stings are, of course, occasionally received but beyond a sharp, momentary pain, no permanent effect will be felt after the first season for the bee-keeper very soon becomes immune to that no swelling takes place.



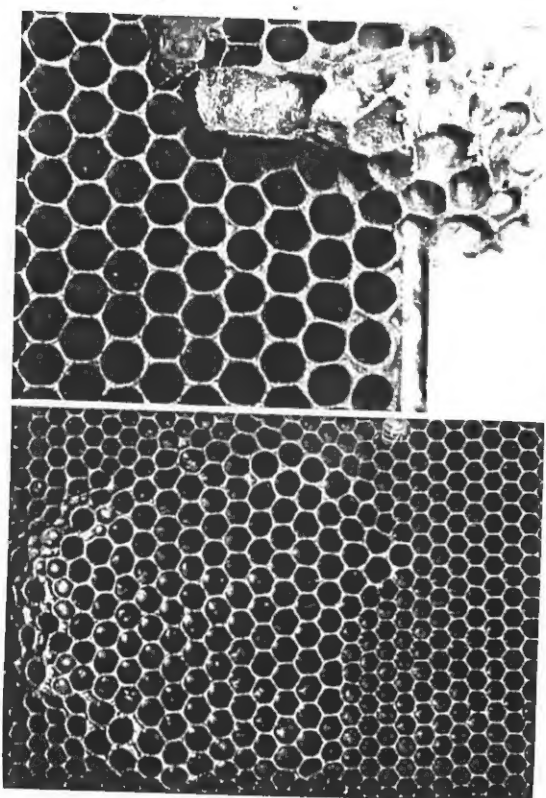




Workers feeding on the honey they have stored in the cells. The workers live only about six weeks in the warm season, possibly several months in the winter cluster.

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Lower left: The queen, or fertile female, is larger and larger than the workers. The cell containing an egg designated to become a queen is larger and irregularly shaped than the face of the comb. Lower right: Brood cells are larger than the surrounding cells built to house worker larvae.



that had conspicuous entrances. There is even a genus of bumblebees, *Psalidopygus*, that, like the solitary bees discussed in a previous paragraph, is dependent on a host species for the rearing of its young. In the case of *Psalidopygus* the host species is always a bumblebee. *Psalidopygus* has no worker caste and it is the workers of the usurped species that rear the brood of the invader.

**Stingless Bees (Meliponidae).**—These bees form a large group of mainly tropical distribution in the Old World as well as the New. In pre-Columbian days, before the introduction of sugarcane and before the establishment in the Western Hemisphere of the Old World bumblebees, the stingless bees were the main reliance of those craving sweets. Columbus made acquaintance with the honey of these bees when during his first voyage he landed in Cuba; in neighboring Yucatan to this day there are flourishing apiaries of *Melipona beccarii*.

The sting of these bees is atrophied and non-functional but they have other means of defense. Some resort to biting. *Trypoxys* (*Oxytrypoxys*) emits a caustic fluid that is highly irritating—a form of chemical warfare long antedating such warfare by man. What often makes stingless bees annoying to human beings is their propensity to penetrate the hair. In Brazil they are called *torre cedillo* (hair twistlers) in consequence. A name applied in Brazil to some of the tiny bees of *Trigona* (*Hypotrigona*) is *lanje* (*olive* eye flickers) because of their habit of lapsing moisture from the eye. Some stingless bees render powerless insect enemies that invade the nest by dabbling them with sticky material—perhaps honey—until they are plied to death. This, curiously enough, is a method of warfare practiced also by a bumblebee (*Bombus terrestris*).

Stingless bees stock the brood cells with food and after an egg has been laid seal the cell after the manner of the solitary bees instead of engaging in progressive feeding of the larva as do the honeybees and bumblebees. Some stingless bees arrange their brood cells in irregular clusters often without orientation and separate these cells by minute intervening pillars of wax. The vast majority, however, arrange the cells in combs. These combs usually lie horizontally one above the other, not vertically as in the case of the honeybee, and the comb consists of a single layer of cells facing upward instead of a double row of cells placed base to base as in colonies of *Apis mellifica*. Honey and pollen are stored by stingless bees not in the cells of a comb but in relatively large pots. Earthen materials, dung, resin, leaf particles, and the like are used in nest-building besides the wax the bees secrete. Some species are ground-nesting, others arboreal. Sometimes the nests are exposed but more often concealed in hollows, frequently with a projecting tube, spout, or trumpet-shaped formation adverting the presence of the nest. Some species erect their structures within the nests of termites. Others occupy the nests of ants; nests of *Aphaenogaster* are particularly favored. A few instances are recorded of the use of birds' nests as places of abode.

Edmond Drory, who in the 1870's tried to acclimatize stingless bees in Bordeaux, asserted that the male not only produced wax like the worker but also performed other tasks. These claims require verification notwithstanding the conscientious source from which they come.

Throughout the Apidae the role of the male tends to be limited to the fertilization of the female.

**The Honeybee (*Apis mellifica*).**—Man's interest in the honeybee and its products is an ancient one. A rock painting in the Cueva de la Araña (Spider Cave) near Valencia, Spain, dating back to Paleolithic times, shows a honey-gatherer climbing to a wild hive while the bees fly about menacingly.



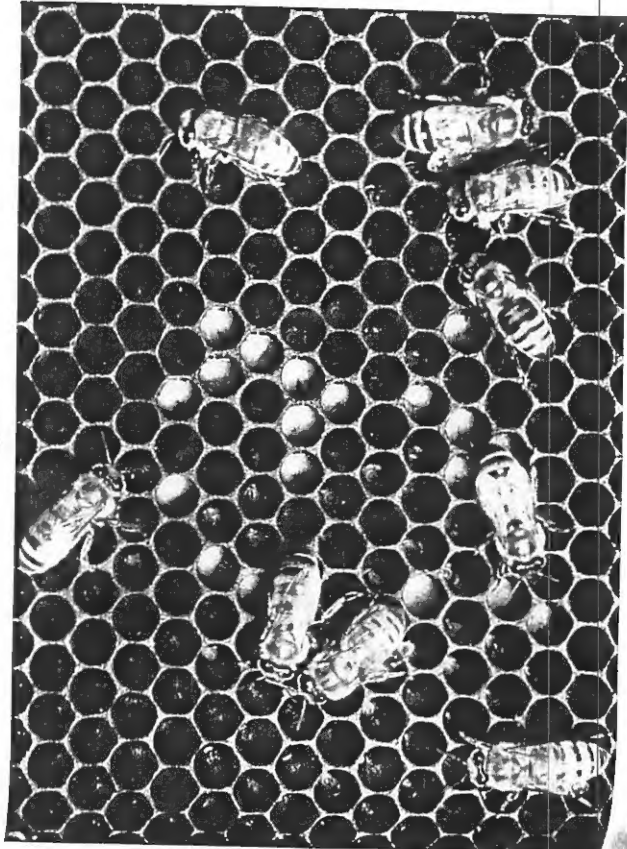
FIG. 8.—Rock painting at the Araña (Spider) Cave, north-west of Jacop, Valencia, Spain, showing an individual honey-gatherer climbing honey from a well-defended hive. About half actual size.

A relief in the Temple of the Sun, built about 2600 B.C., indicates that at that remote date beekeeping was practiced by the Egyptians. Techniques of apiculture which are sometimes thought of as modern—for instance, the transfer of hives from one region to another to take advantage of the nectar flow—were known in the Nile region as long ago as the 3d century B.C. *Apis mellifica* has been introduced to many regions of the Western Hemisphere but originally it was a stranger to that half of the globe. It reached New England through the agency of man in the first part of the 17th century.

Several members of the genus *Apis* occur in the Indo-Malayan region. In addition to *Apis indica*, very closely allied to *mellifica*, there are the giant honeybee (*Apis dorsata*) and the dwarf honeybee (*Apis florea*). In the huge semicircular comb of *dorsata*, sometimes three or four feet in diameter and suspended usually from the branch of a tree, the brood cells are of one size. This uniformity accords with the condition in nests of the stingless bee genus *Melipona*. On the other hand *florea* builds, like *mellifica*, brood cells of three different kinds, dependent on the sex and prospective caste of the occupant.

The honeybee queen mates in flight. A single copulation usually enables the queen to lay fertile eggs throughout her subsequent life of several years. Her egg-laying capacity is impressive, varying from a few eggs daily in early spring to as many as 1,500 to 2,000 per day at the peak of oviposition. Under special conditions even up to 3,000 eggs a day may be laid. Unfertilized eggs give rise to males.

All larvae are nourished for the first two or three days with royal jelly, probably a secretion of the lateral pharyngeal glands of the worker. At the end of this period honey and pollen are substituted as the diet of the prospective workers and drones, but royal jelly continues to be the food of a larva reared to be a queen. This difference of diet rather than any difference in the

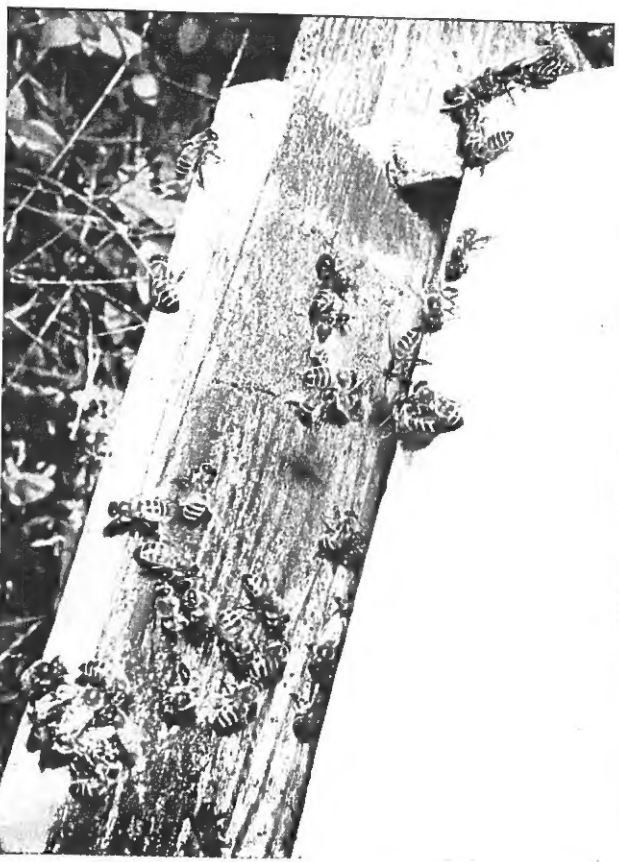


BEE

White larvae of the honeybee, in various stages of growth, are shown here inside the cells of the comb structure. They are still legless and must be supplied with food by the adults.

Bernard L. Clark

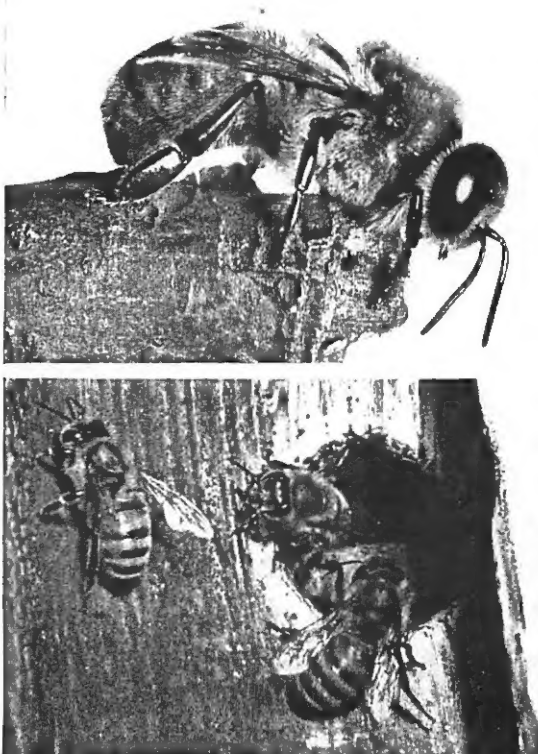
Below, worker bees drop, aging drones and weeding or dislodged workers out of the hive. One of the workers' many responsibilities is to maintain the productive efficiency of their caste.



When gathering pollen, a bee almost unfailingly goes to flowers of the same species. Seldom is more than one species of plant visited by an individual bee on any one trip.

Bernard L. Clark

Lower left: The drone or male bee has no sting and does no work besides mating with a new queen, whereupon he dies. Lower right: Worker guards are stationed at each entrance to the hive to chase away bees from other hives coming to steal honey. This guard personnel is constantly changing but always on the alert.





menaces the existence of the Colletidae. Now and then *Nomada*, another inquiline genus of the Anthophoridae, lays its eggs in the nests of *Eucera*, belonging to the same family, but predominantly the victims are members of the genus *Andrena*, type genus of the Andrenidae. The nests of Paururidae and Halictidae are also occasionally invaded by *Nomada*.

**Eupossidae.**—These bees are confined to the tropics of the New World and are insects of singular beauty, with brilliant metallic reflections and sometimes with abdominal hair bands of contrasted coloration. Remarkable in this family is the tongue (glossa), which frequently exceeds the length of the insect itself and, carried exposed below the abdomen, extends often well beyond the anal extremity. Another structural distinction



Fig. 7.—a, A male, natural size, of *Euphonia* *brillia*, showing the full extent of the wholebe (mandible, maxilla, and labrum) of a short-tongued species. *Colletes* *terrestris*, b, a male, natural size, of a long-tongued species. *Colletes* *terrestris*, c, a male, natural size, of a species with a very long, extensible tongue. The C. *terrestris* and the *E. brillia* are of the same natural size.

of these bees is the presence on the hind tibiae of the corbicula or pollen basket, which, alone among the solitary bees, *Eupossidae* share with the three exclusively social groups of bees—*Bombinae*, *Halictinae*, and *Apidae* (here confined to the genus *Apis*). The last three are also characterized by their ability to produce wax. *Apidae* produce it ventrally on the abdomen, *Halictinae* dorsally, and *Bombinae* both ventrally and dorsally. The wax is used in cell construction.

**Bumblebees (Bombinae).**—There are hundreds of kinds of bumblebees. Representatives of the family are found from Greenland and Alaska in the Far North to the southern tip of South America. Bumblebees are essentially a high altitude and high latitude fauna, however, and as a rule are absent from the tropical lowlands. In the Old World they are well represented in Europe and Asia and occur also along the Mediterranean fringe of North Africa, but the Sahara Desert has proved a barrier to their penetration southward. Australia has no native bumblebees. In New Zealand, originally also devoid of bumblebees, they are an essential part of the fauna since 1885. Until their introduction, red clover, which is largely dependent on certain bumblebees for its pollination, was not successfully grown. Red clover in turn is of importance as fodder for sheep, and thus a leading industry; sheep-raising of New Zealand owes its development in no small measure to the bumblebees.

Among the differences between bumblebees colonies on the one hand and colonies of the honeybees and of stingless bees on the other, is that, while the latter establish themselves by swarming, the bumblebee nest is usually founded by a single individual—the queen—who in addition to her activities in egg-laying engages initially also in foraging so as to provide sustenance for the brood that emerges from the eggs. The ability of the bumblebee queen not only to lay eggs but also to gather nectar and pollen after the manner

of the females of the solitary bees is due to the fact that structurally she is scarcely different from her conspecific worker. She is provided with a corbicula (on which the moistened pollen load is carried home) comparable to that of the worker. The honeybee queen and the stingless bee queens, on the other hand, have undergone such extensive structural modifications that they are no longer capable of field activities and in the economy of the hive are restricted to egg-laying.

Colonies of the honeybee and of the stingless bees are perennial and some of them survive over many years, with new broods of workers taking the place of those that have completed their rather brief life span. The queen continues to oviposit successive broods of her worker daughters. On the other hand, in the case of the bumblebees (with the exception, it would seem of some species of the tropics) the colonies are annual affairs and although the old queen enjoys the longest span of life, she too, like the worker and the female, dies at the end of the annual cycle. The recently emerged young queens and copulations inherent, frequently, in the soil, and in the spring each establishes independently a new nest, and in turn succumbs in the course of the year.

Bumblebees usually nest in or on the ground. The vacated nest of a small mammal—fieldmouse, chipmunk, vole, or the like—is apt to be favored. Here the overwintered young queen establishes her honeyvat and constructs the waxen egg cell that is to produce the first brood of workers. The queen, in addition to providing the food for her first brood, incubates this progeny, probably furnishing needed warmth.

Some bumblebees fashion one or more pockets of wax at the side of each mass of developing larvae and into these pockets drop their load of pollen on which the larvae feed. To such bees F. W. L. Shallen gave the name of pocket-makers. Other bumblebees store their provisions in cells detached from the bunches of larvae and these Shallen designated pollen-torers. Vacated cocoons are frequently used for the storage of honey but certain species construct waxen honey-pots as well. Shallen noted that the honey in these waxen pots was thin, while that in the cocoons was dense, and drew the conclusion that the former was for daily consumption, the latter reserved for periods of scarcity. As the first broods mature, new brood cells are constructed near the top of the cocoons and thus the colony expands.

One of the persistent myths that crops up from time to time in connection with bumblebees is that a particular bee, designated the trumpeter, sounds reveille for the hive by humming as she fans her wings from a vantage point on the nest. It is true that an individual bee or even several bees may vibrate their wings in this manner and give off sounds, but the phenomenon may occur at any time, whether morning or evening, and the humming is merely incidental to an act that is concerned with the ventilation of the nest. The act is not a single call to the colony to beat itself but a substitute for an electric fan.

Even when a bumblebee queen after diligent search has taken possession of a nest site, her return may be disrupted. Intruding queens sometimes kill and replace the legitimate founder of a colony. Otto Ernst Plaht found on several occasions as many as eight or ten dead queens in nests

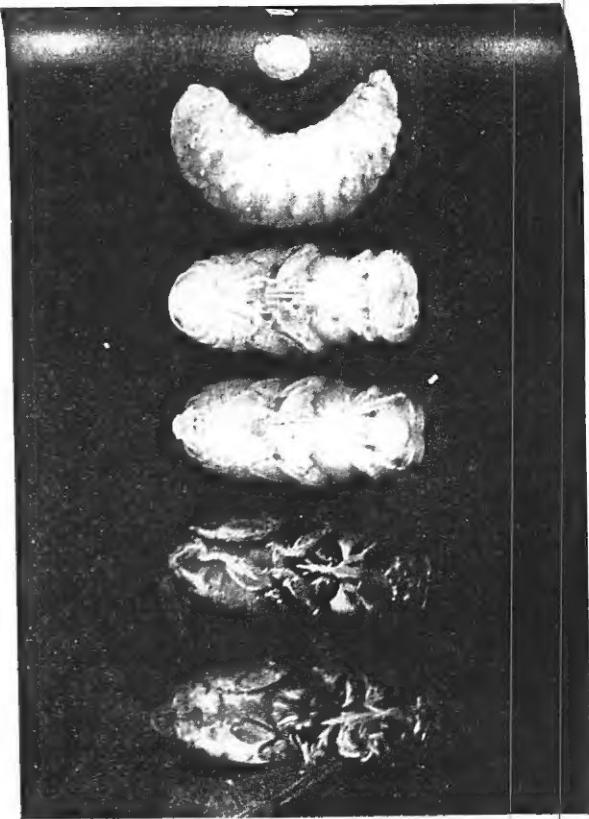


Fig. 8.—The life cycle of the honeybee. Left to right: (1) Egg, (2) young larva, (3) mature larva, (4) a white pupa, (5) a pupa in which the adult has become fully colored and is ready to emerge, and (6) an adult worker with fully-formed wings.

BEE

Fig. 9.—Photograph by Charles E. Davis. From "Honeybees and Their Enemies," by Charles E. Davis and Mary M. Hogue. Copyright, 1931, by Van Nostrand Company, Inc.

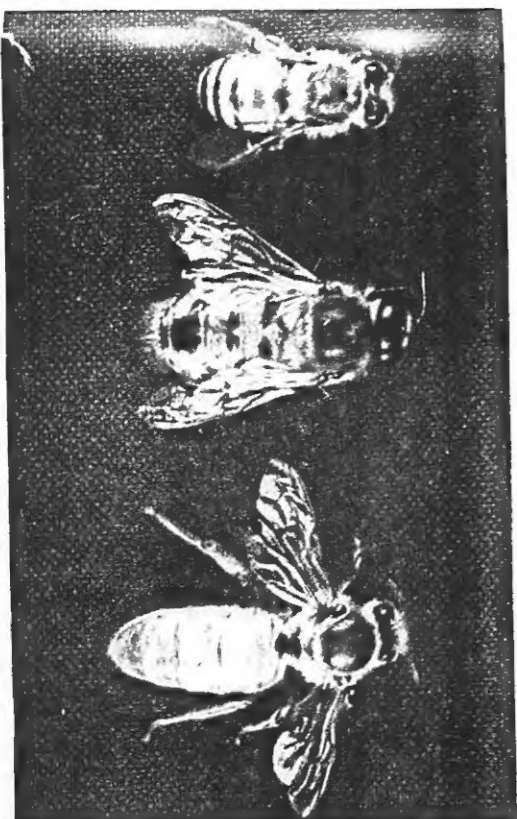


Fig. 9.—Three castes of the honeybee. Left to right: (1) Worker, (2) drone or male, and (3) queen. Note that the queen is the largest of the three, and providently the bees which we ordinarily see are all workers.





